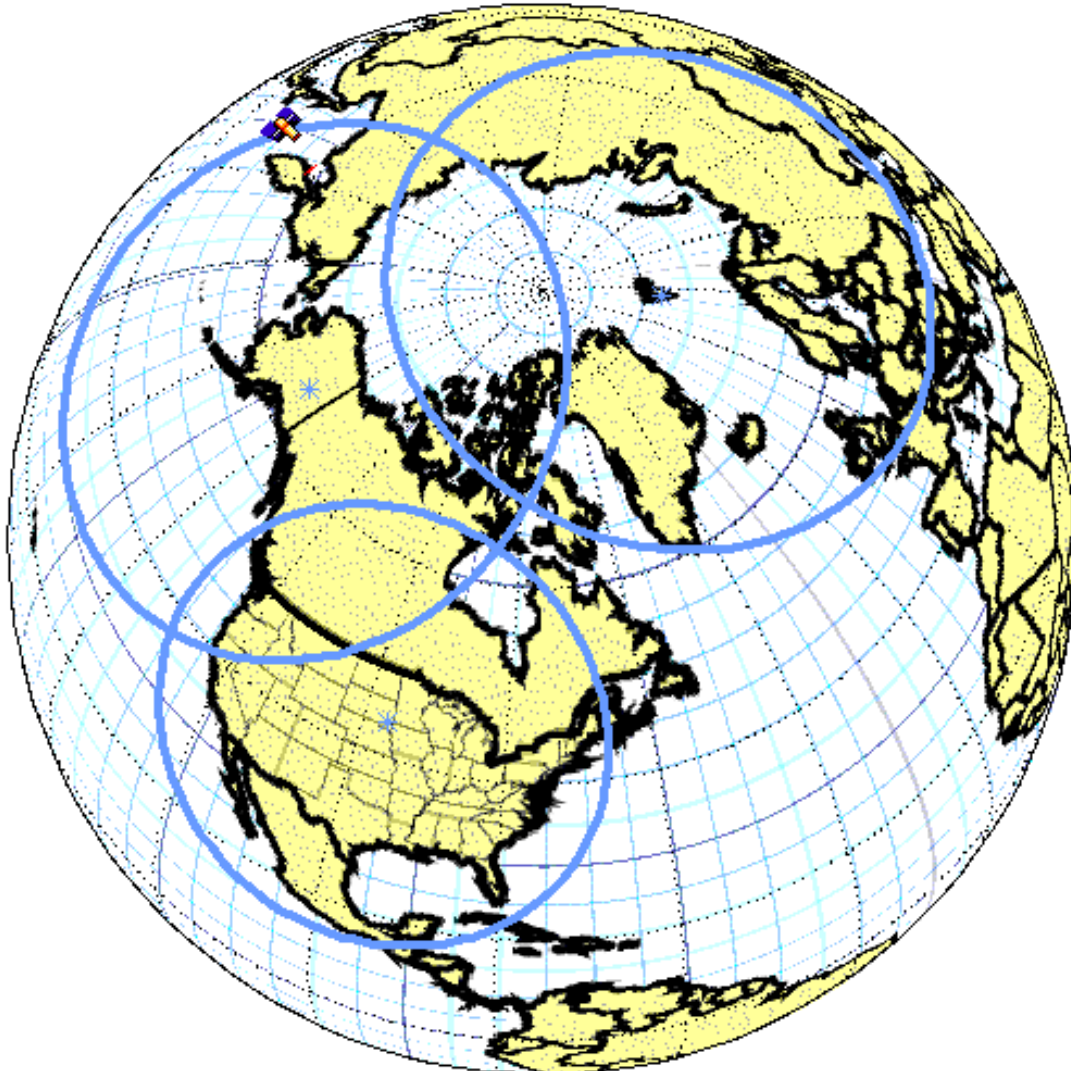


# **Landsat 7 International Ground Station Network**

# U.S. Landsat Receiving Stations

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## Downlink

- ~140 scenes per day to EDC
  - 40 per day of USA; 100 per day outside conterminous U.S.
- ~110 per day to U.S. operated polar ground stations (PGS)
  - Poker Flat, Alaska
  - Svalbard, Norway

## Ingest and Archive

- Scenes downloaded to EDC processed and archived within 24 hours
- Scenes downloaded to PGS captured on tape and shipped to EDC



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# Data Acquisition

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- Acquisition schedule
  - Use Long Term Acquisition Plan (LTAP) to select 250 “Best” scenes per day for U.S. archive
  - Acquire additional 200 scenes for International Cooperator (IC) stations
  
- System constraints
  - Spacecraft and instrument duty cycles limit number of scenes
    - 34 minutes per orbit and,
    - 52 minutes per 2 orbits and,
    - 131 minutes per 6 orbits and,
    - 240 minutes per 24 hour period
  - On-board recorder has capacity for ~100 scenes
  - Ground processing throughput limits U.S. acquisitions to 250 scenes per day
  
- Image collection
  - Stored on recorder for later download to U.S. ground stations and/or
  - Real-time downlink to U.S. and International stations



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# Scheduling Software

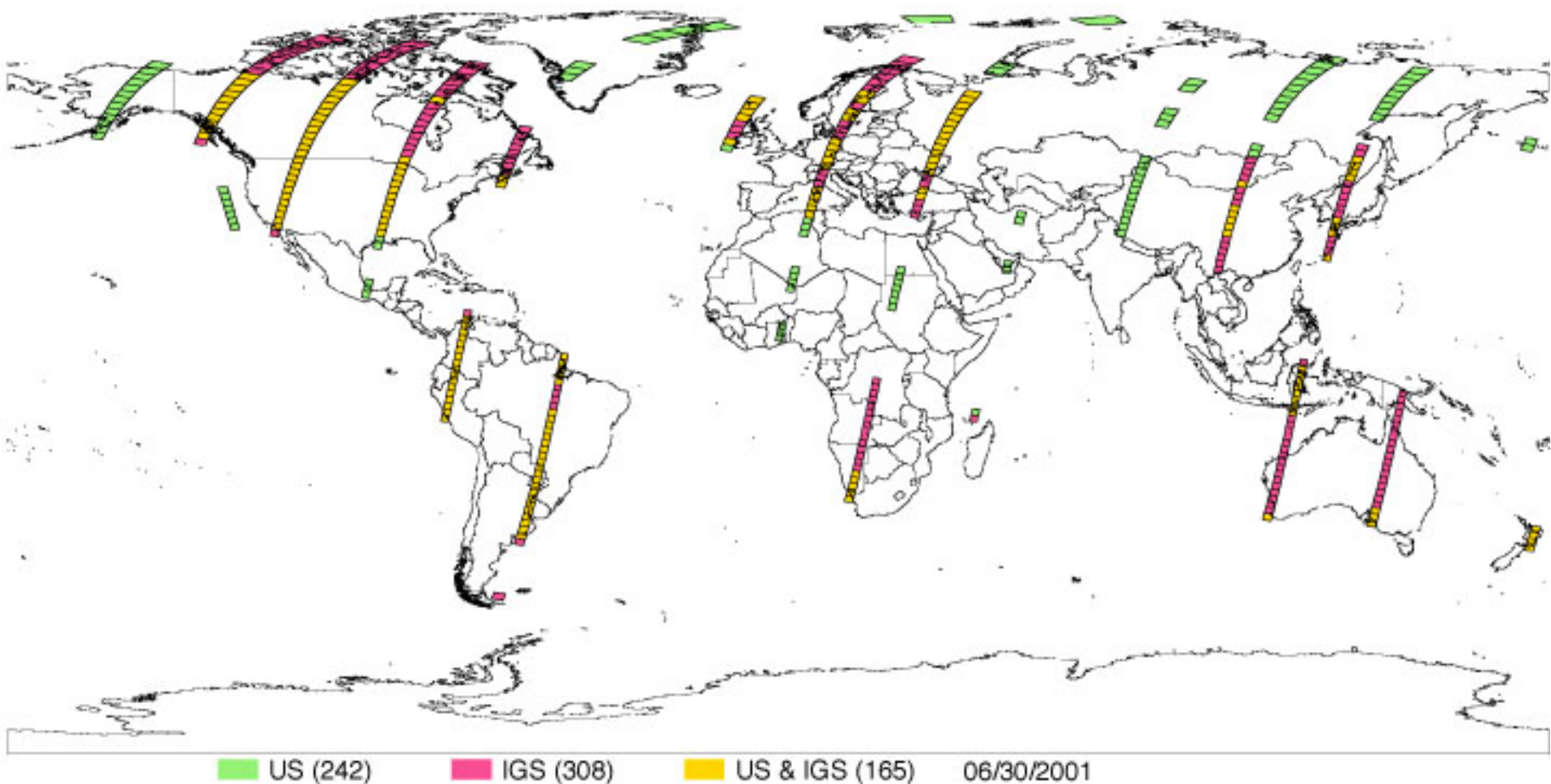
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- Scheduling software
  - Knows position -
    - “Where CAN I see today?”
  - Knows time of year -
    - “Is the Sun high enough for a good image?”
    - “Will an image taken today capture change?”
  - Knows predicted cloud cover -
    - “Is a scene less cloudy than normal?”
  - Knows history -
    - “When was this scene last acquired?”
    - “How good/bad was the most recent acquisition?”
    - “How good was the best acquisition thus far this season?”
    - “Can a better image be mosaicked using recently acquired neighboring images?”
    - “How many more times will this scene be available this season?”
    - “Did someone make a special request for this scene?”
  - Knows resource limits -
    - “How long have I been on?”
    - “How much data is in the Solid State Recorder?”
    - “Where is the nearest ground receiving station?”
    - “Is a GXA available?”
    - “Should I trade an isolated scene for a group of scenes along a path?”



# One Day's Acquisitions

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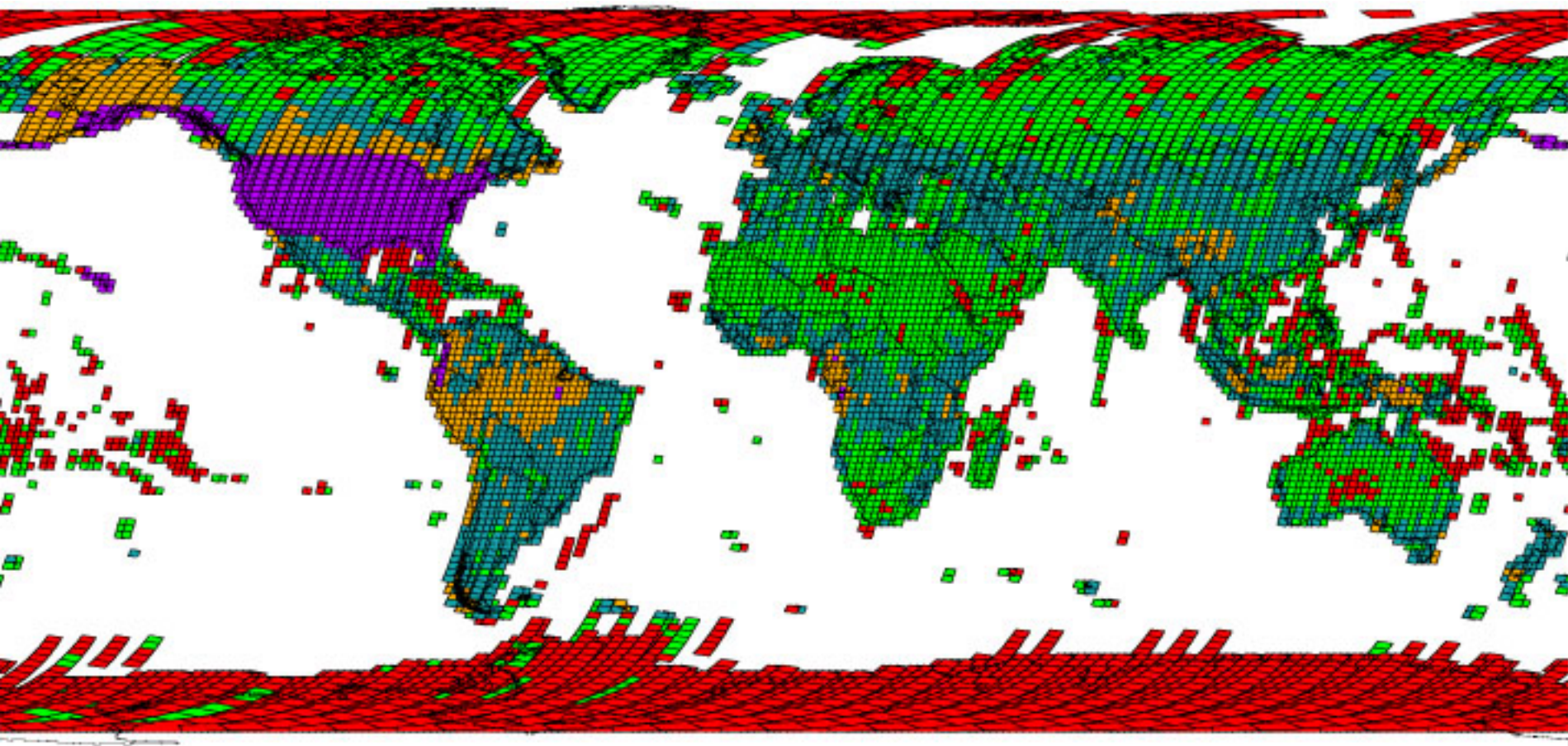
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# Data Archived through 3/31/2001

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Acquisition Frequency (141,085 scenes)

06/28/1999 - 03/31/2001

Landsat 7 data archived during the first 21 months of operation.

1-5 6-12 13-20 21-31 32-42

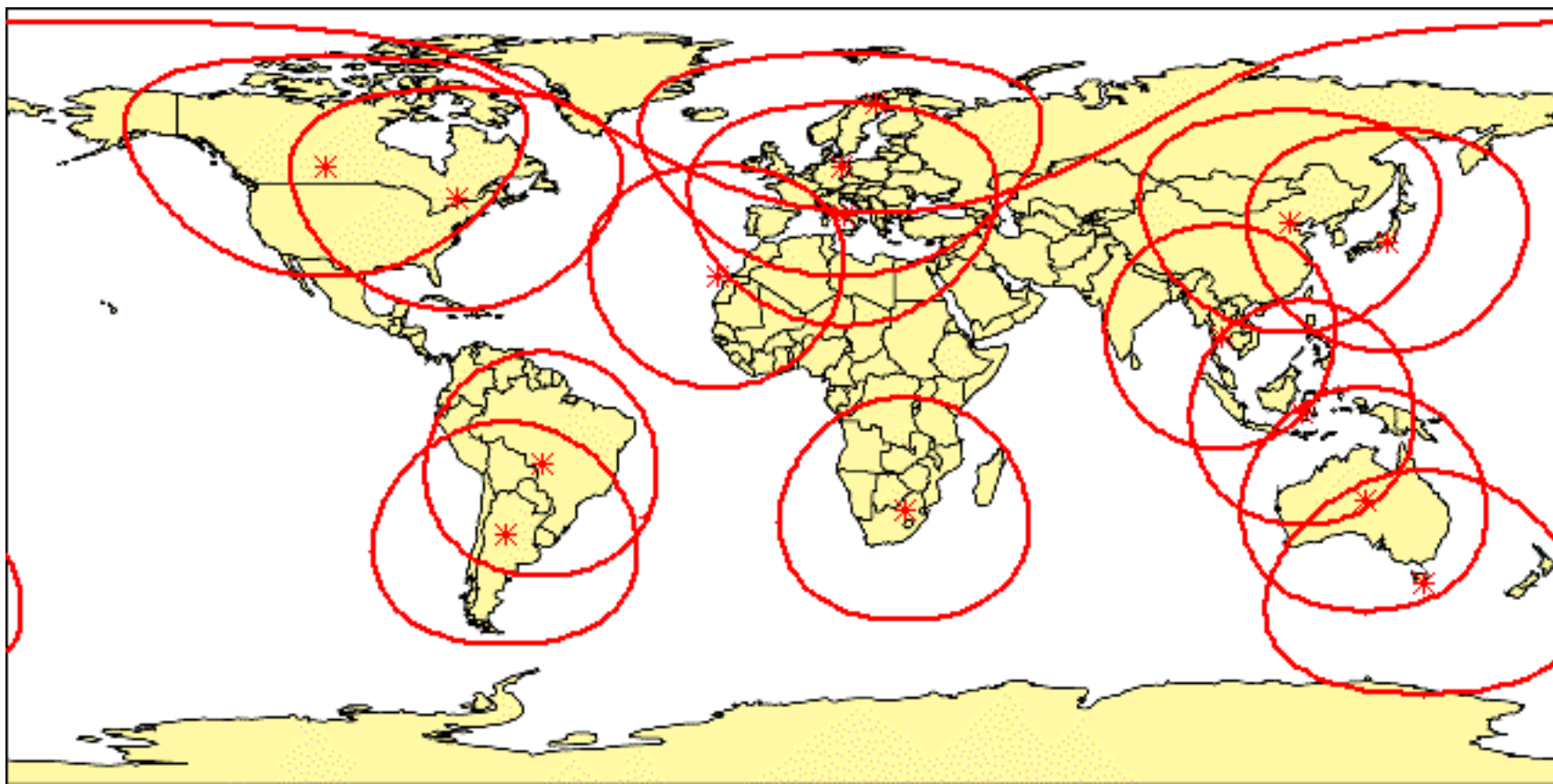


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# International Cooperator Network

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# International Ground Stations

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- Ten ICs with 16 operational stations
  - Argentina
    - COA - July 18, 1999
  - Australia
    - ASA - July 6, 1999; HOA - July 14, 1999
  - Brazil
    - CUB - November 10, 2000
  - Canada
    - GNC - July 6, 1999; PAC - July 6, 1999
  - China
    - BJC - March 1, 2000
  - ESA
    - FUI - July 8, 1999; KIS/MPS - July 8, 1999/ December 14, 1999; NSG - July 15, 1999
  - Indonesia
    - DKI - November 1, 2000
  - Japan
    - HIJ/HAJ - March 1, 2000/May 1, 2000
  - Thailand
    - BKT -Testing now
  - South Africa
    - JSA - July 1, 2001



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# International Cooperators

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- USGS authorized to negotiate international agreements
  - Agreements are with Government or Government entities
  - International Cooperator (IC) pays initialization and annual cost-sharing fees.
- USGS provides Landsat 7 data
  - Amount of data downlinked is subject to negotiation.
  - Direct downlinks only. No use of Solid State Recorder (SSR).
  - International Ground Station has lowest priority in acquisition schedule.
- IC must distribute Landsat 7 products in one of three formats:
  - HDF, GeoTIFF, Fast Format.
- IC must ensure all Landsat 7 data is available for sale and distributed on a non-discriminatory basis.
- IC must provide metadata to EDC on a monthly basis.
  - IC must provide browse or make available on-line via Internet.



# International Cooperators

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- IC must maintain archive for at least 10 years
  - Must give right of refusal USGS before purging Landsat 7 data.
- IC must agree to exchange data with USGS in standard format for:
  - key Government programs
  - quality assurance
  - contingency due to SSR failure
- USGS retains ownership of all raw Landsat 7 data. IC may:
  - use
  - set price
  - place copyright
  - restrict redistribution, etc.
- USGS will terminate downlinks if IC not in compliance with MOU.



# Three Types of Stations

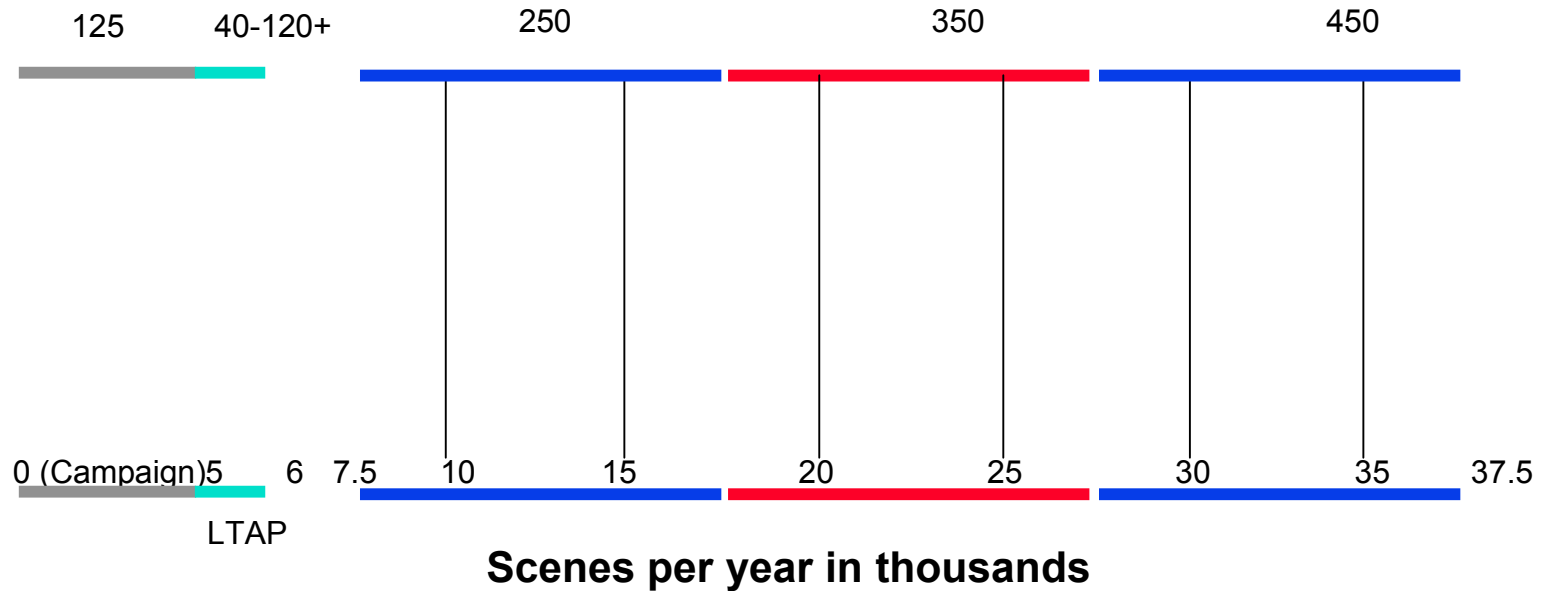
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- “Standard”
  - Generally, broad area coverage
  - Three volume classes
    - 17,500 scenes/year (\$250,000)
    - 27,500 scenes/year (\$350,000)
    - 37,500 scenes/year (\$450,000)
  
- “Campaign”
  - Short term (limit of two 96 day campaigns/year)
  - Low volume (limit of 5,000 scenes/year)
  - Includes per scene cost
    - Campaign Fee (\$25,000/campaign) + \$25/scene
  
- “LTAP”
  - Copies U.S. acquisitions
  - Can limit volume to lower cost (\$40,000 minimum)



# Current IGS Fee Structure

Annual cost share fee in thousands of dollars \*



\* Cost share fees do not include initialization



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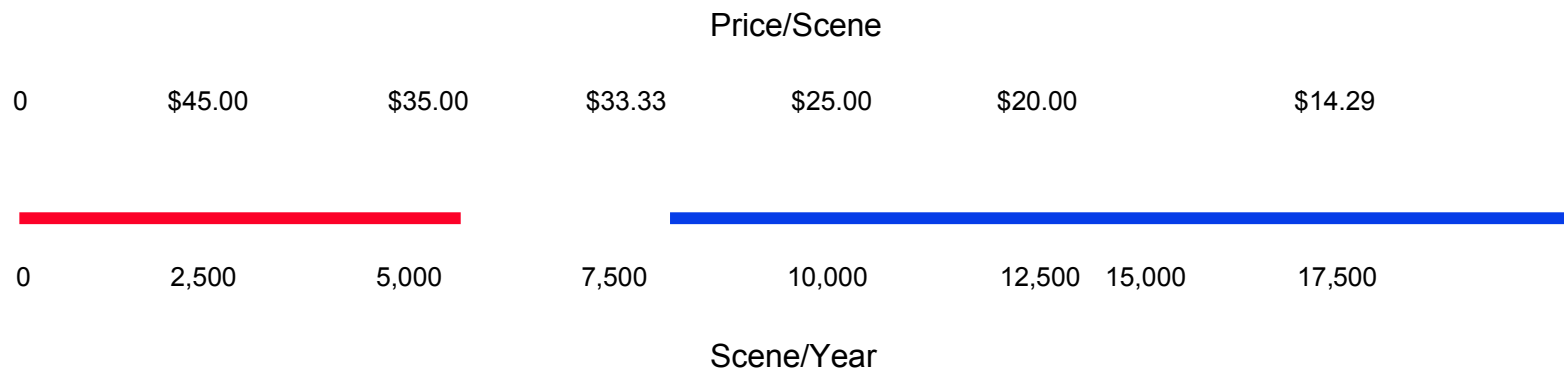
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# Campaign Station Fees

**Campaign Fee + Data Collection  
Fee\* (\$175,000)**

(Assumes 2 campaigns/year)

**Annual cost share fee\*  
Volume Class I (\$250,000)**



\* Cost share fees do not include initialization



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# LTAP Station Fees

0	\$40,000	\$80,000	\$120,000
0	330 (2,000)	660 (2,000)	990 (6,000)
WRS-Scenes (Acquisitions/Year)			
<b>WRS-2 Scenes (Acquisition s/Year)</b>	<b>990 (6,000)</b>	<b>660 (4,000)</b>	<b>330 (2,000)</b>
<b>LTAP Only</b>	<b>\$120,000</b>	<b>\$80,000</b>	<b>\$40,000</b>
<b>LTAP Plus (Additional 9/6/3 High Priority Scenes</b>	<b>\$30,000</b>	<b>\$20,000</b>	<b>\$10,000</b>

\* Cost share fees do not include initialization



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# IGS Data Acquisition (“standard”)

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- Service (acquisition) requests
  - Sent by IGS to MOC via ftp “drop box”
  - Stations request scenes over their in-view circle
    - Can request far in advance or daily/weekly
- Contact schedules
  - Sent to stations daily (~20:00 gmt)
  - Tells stations what they will receive
  - Long Term Acquisition Plan “anchors” selections
  - Duty cycle constraints mean some requests are rejected
- Scheduling software has been enhanced to better serve IGS
  - Added second pass to re-consider rejected scenes
  - Added cloud filter to determine which scenes to reject
  - Changed from “Host/Non-Host” to “Three-Tier” prioritization



# Three-Level Prioritization Scheme

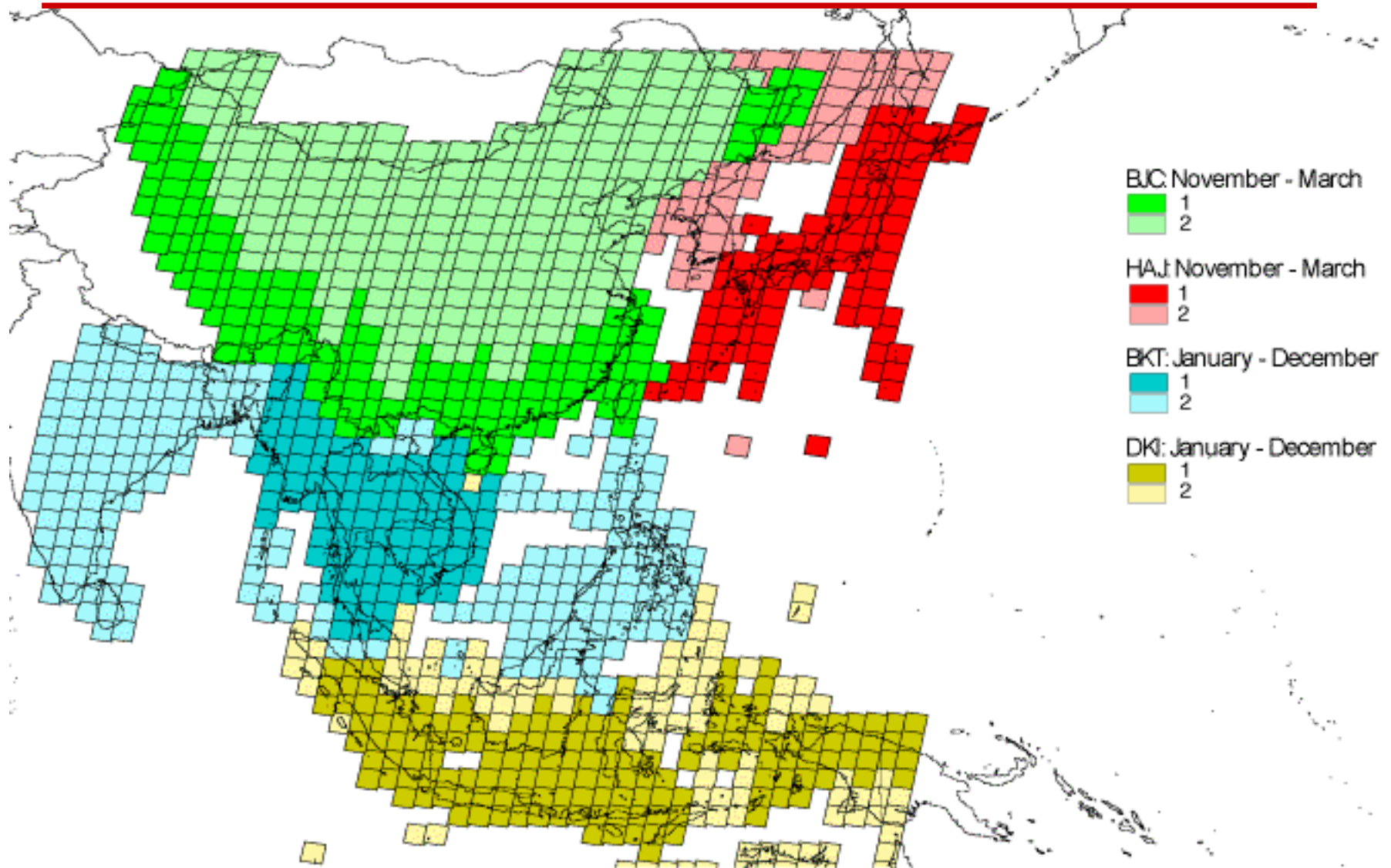
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- WHY:
  - Host/Non-Host nation scheme did not allow ICs to designate “must have” scenes
- WHAT:
  - Implement a high/medium/low priority scheme
  - High - 10 scenes per day (contiguous, can be across 3 paths)
  - Medium - 300 scenes over 16 days
  - Low - everything else
    - Campaign stations will only use high and low
- HOW:
  - Worked with ICs to determine scene priorities



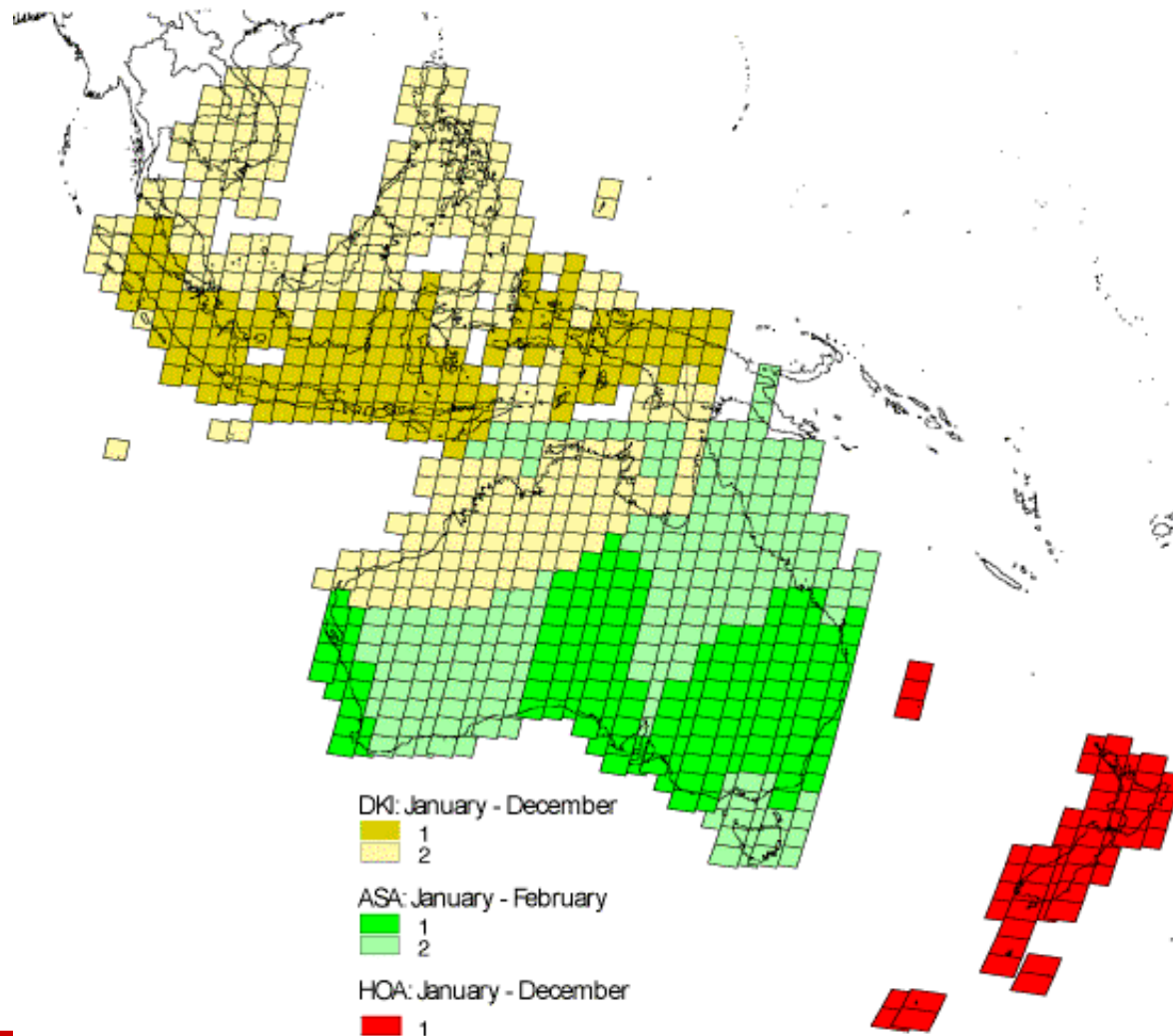
# Regional Priorities: Northern Asia

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# Regional Priorities: Southern Asia

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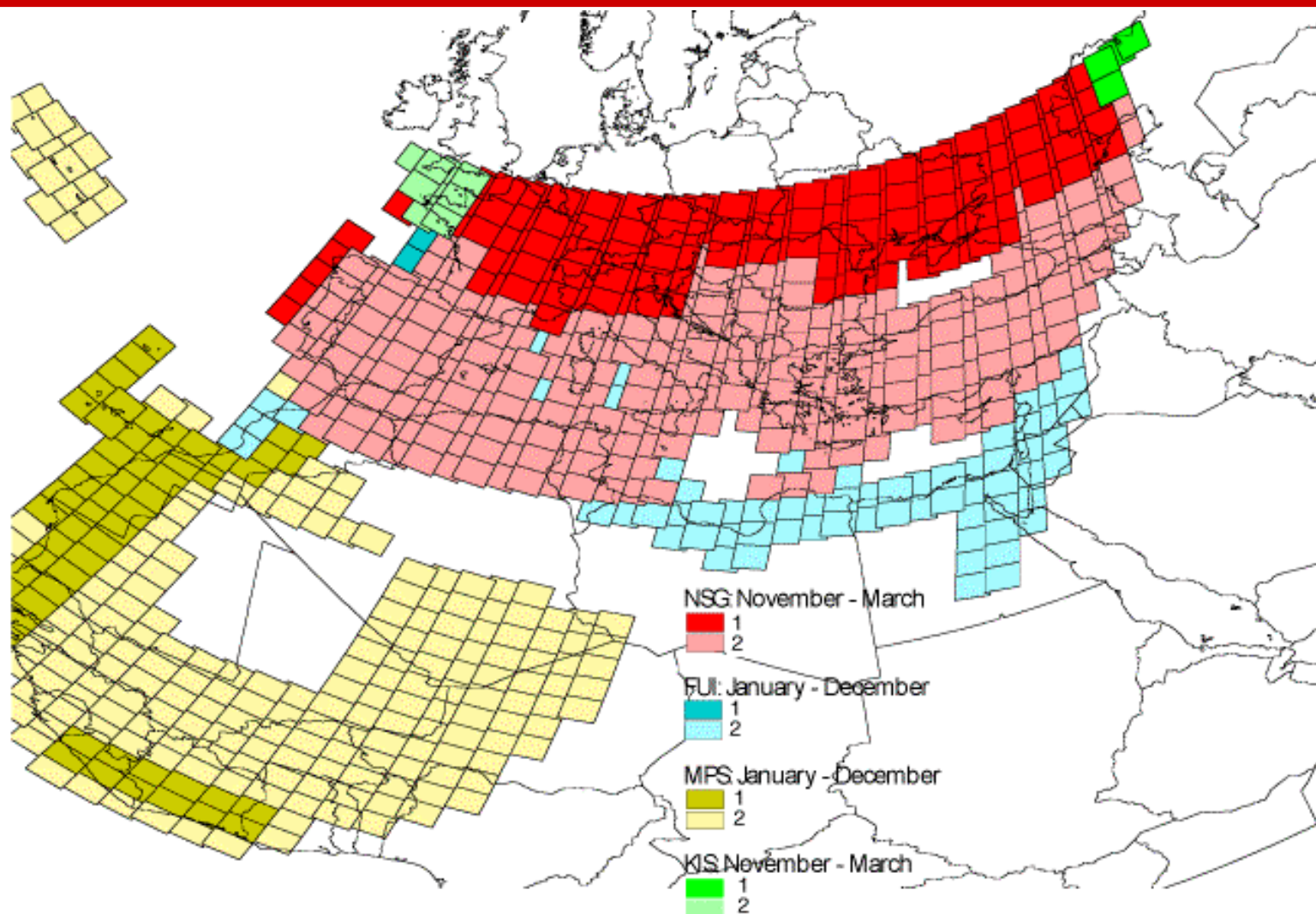
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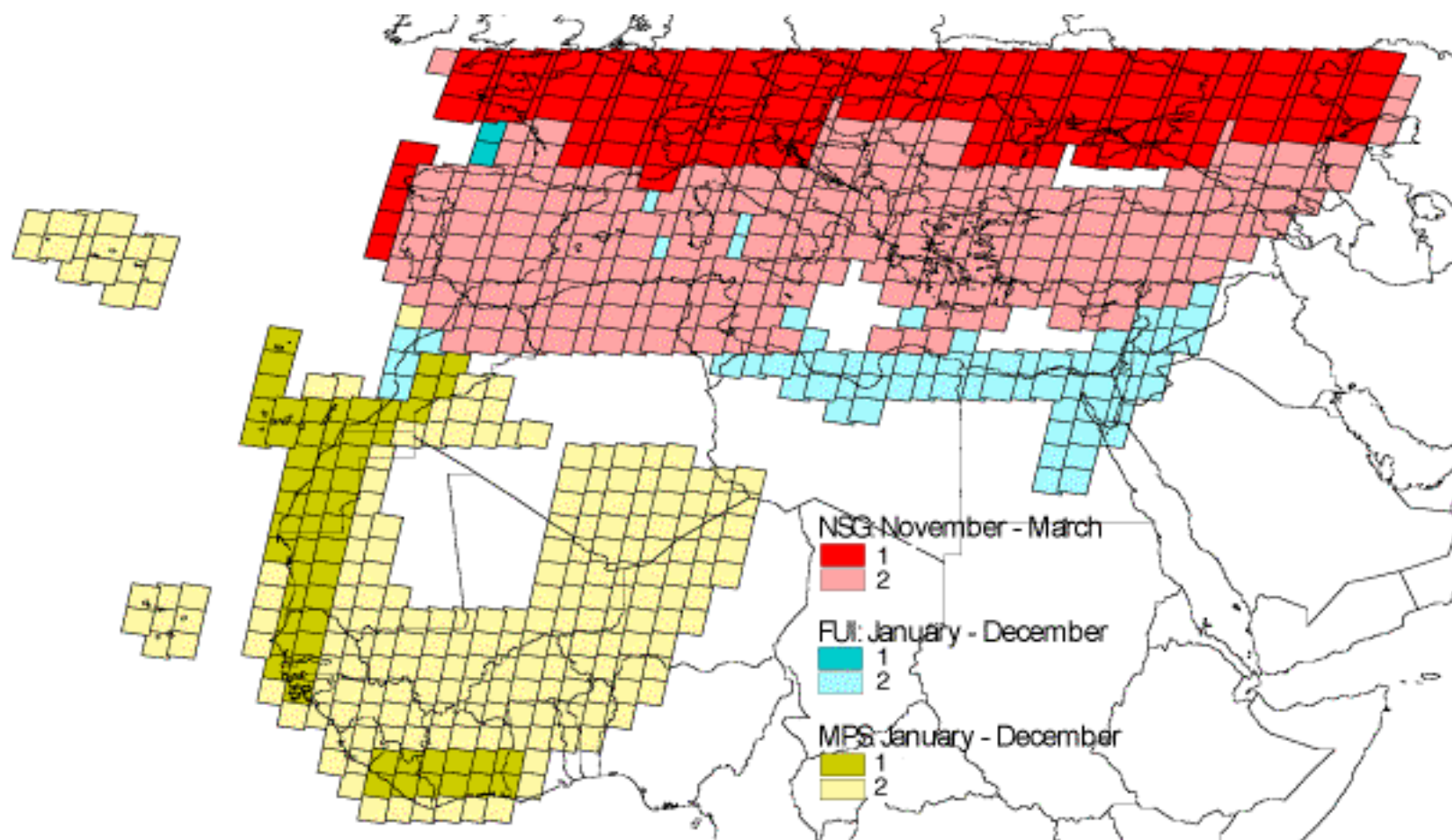
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# Regional Priorities: Northern Europe



# Regional Priorities: Southern Europe



# Regional Priorities: South America

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